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ABSTRACT

The Grid Systems is a phonetic learning device designed by McGinley (1982) to develop adult vocabulary. The name is derived from the fact that the student workbook is set up on a grid, with the top of the page showing the vowel sounds and the left side the consonant sounds. Words are formed on the grid where these sounds combine (some of the spaces on the grid will be empty because that coordinate of sounds does not make a word). First the teacher, then the student says these words, progressing from monosyllabic to multisyllabic words. The repetition allows students to deduce generalized rules for spelling and pronunciation of an ever increasing number of vocabulary words. To determine what effect instruction in the Grid Systems would have on the reading comprehension of college students in developmental reading classes, 141 students in three separate classes received supplemental grid instruction. A control group of 42 students received no such instruction. Pretesting and posttesting were done with a standardized reading comprehension test. Results showed that those students receiving instruction in the Grid Systems showed a significant grade gain in comprehension over those in the control group who did not receive such instruction. (FL)

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THE EFFECT OF THE GRID SYSTEMS
ON
READING ACHIEVEMENT OF COLLEGE STUDENTS

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by

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of the requirements of the Master of Arts degree
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ABSTRACT

The study was designed to investigate what effect instruction in the Grid Systems would have on reading comprehension of college students in developmental reading classes. Students were pre- and post-tested with the Nelson-Denny Reading Test. Population consisted of 21 students of the summer, 1982 classes, 61 of the fall 1982 classes and 59 of the summer, 1983 classes receiving supplemental instruction in the Grid Systems. There was a control group of 42 of the summer of 1982 who did not receive instruction in the Grid. Those who received instruction showed a significant grade gain in comprehension over those without instruction.

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INTRODUCTION

An essential element of success in earning a college degree is reading achievement. Subskills of reading such as vocabulary, rate, and comprehension are necessary for the incoming freshman to possess. Yet there are many who are coming without these skills. They do not see words in groups or phrases, they do not decode automatically, and they may not have an adequate vocabulary to understand the decoded word. As the reader struggles with new words, stopping to sound them out with complex rules of phonics possibly mismemorized, the gist of the sentence is lost. Repeated such stops result in taxation of short term memory and therefore loss of comprehension.

Reading and study skills classes have been designed by most campuses to remediate these readers. Studies cited at the Annual Conferences of the Western College Reading Association showed such classes to be meeting their goals. Reading test scores and grade point averages go up.

Different institutions have tried a variety of approaches to guarantee success for their developmental students. Tutor training has been revised at the Ohlone College Reading Center (1975). California State University reports the establishment of a "panic clinic" to help students at the critical exam periods (1976). Elinor M. Michel of the University of Idaho seeks new devices to accomodate new groups of students in her developmental reading classes (1976). Colleges and Universities are looking

for creative, effective methods of promoting reading achievement that will lead to classroom success.

Kean College has been a leader in providing support for students lacking vital reading and study skills through a summer program, fall and spring developmental classes with weekly lab in the study skills center, and optional tutors. The reading department spearheaded a course in 1973 designed to improve reading skills before it was mandated by the State of New Jersey (1976). The programs are consistently evaluated and a variety of materials are used. One such recent innovation in the program was the Grid System.

The Grid System was devised by McGinley and published in 1982. It is entitled an Adult Reading/Writing Vocabulary, Phoneme/Grapheme Experiences from the Grid System in two workbooks. Vocabulary words used are arranged on a grid and progress from one-syllable words to multi-syllabic ones. It is designed to be used in a class with an instructor saying the words in a column, having students repeat the words. Generalizations are deduced rather than declared.

Mazurkiewicz (1982) cites a study done at Kean College in which the Grid System was employed to help students in remedial classes. Professors were instructed in its use and employed the system for thirty minutes of class time. He found a significant gain of almost twice the normal grade gain over students not using the Grid System in the summer program of 1982 and the fall session of 1982. We seem to be able to attribute this gain to the vocabulary development and generalization of skills needed to recognize words automatically.

These statistics invite a closer look at the Grid System with possible recommendations for its continued use in the developmental courses.

STATEMENT OF THE PROBLEM

A large number of students enroll in our colleges who are unable to meet the demands of college level reading material. Some seek admittance who are reading below the ninth grade level in comprehension and must make marked improvement in order to cope with the increasing work load they will face in their college years. Many students at Kean College are helped through the EEO program and developmental reading classes (0410 and 0411). If a system could be devised whereby these necessary reading skills could be taught more quickly and/or with greater gain it would be beneficial to the student and rewarding to the professor.

HYPOTHESIS

Students using the Grid System in EEO and developmental reading classes will make no significant grade level gain in the Nelson-Denny Reading Test over those being taught by the regular system not employing the Grid System.

SIGNIFICANCE OF THE PROBLEM

A highly technological society has produced the need for more skilled college graduates. Computers, microfilm, ticker-

tape, and an ever increasing number of publications bury us with information. An emphasis on the global community and the interdependence of nations gives us the sense of being responsible for all that goes on in the world as well as beyond. We need educated leaders in all fields who will be able to efficiently and effectively deal with the information explosion. Yet we find ourselves in a time of inclusiveness that demands our concern for the educationally deprived. The students are those with keen minds and insight who would benefit from a college education but whose skills in reading and study are such that they are not able to process the information necessary for college work. The required open enrollment program has put more responsibility on the college for admitting and education a less selective population.

Our colleges need to use the most effective means of insuring the probability of success for all students admitted. The Grid System may be one answer that will be of help preparing students for the challenges they will face.

DEFINITIONS

Grid System - is a patented (#4,030,211) phonetic learning device designed by McGinley to develop vocabulary for the adult. The student workbook is set up on a grid, hence the name. The top of the page shows the vowel sounds and the left side the consonant sounds. Words are formed in the grid where these sounds combine. An example is the long "a" sound /a/ combined with the "m" sound /m/ creates "Mame" and "maim." The professor then the student say

these words progressing from monosyllabic to multisyllabic words. The repetition allows the student to deduce generalized rules for spelling and pronunciation of an ever increasing number of vocabulary words. Some of the spaces on the grid will be empty because that co-ordinate of sounds does not make an English word.

EEO - Exceptional Educational Opportunity - A program designed to assist students who do not achieve minimal standards of academic performance in high school courses or S.A.T. scores and yet exhibit motivation and potential for college. Those admitted under this program are required to attend a six week summer program which includes a developmental component. Reading and study skills are a part of that. Students who successfully complete this program matriculate in the fall and take developmental courses 0410 and 0411.

0410 - Study Skills Lab - A non-credit course of the communication sciences department with individualized instruction in the various aspects of reading and study skills. Other incoming freshmen besides the EEO students take the course if they fail to achieve a 9.0 grade level of reading on the Nelson-Denny Test.

0411 - Reading Improvement - A non-credit course of the communication sciences department designed to further improve reading and study skills needed in the credit courses. Incoming freshmen scoring between the 9th and 12th grade level are required to take this course.

The Nelson-Denny Reading Test - A valid instrument which tests vocabulary and reading comprehension.

he, she - For ease of reading the term "he" will be used

for the student and "she" for the instructor, with the realization that there are also female students and male instructors.

ASSUMPTIONS AND LIMITATIONS

It is assumed that the instructors of the course are of basically the same competence since they must all be certified reading specialists with an M.A. degree and that they are using the prescribed material for both the usual instruction and the Grid System approach. It is also assumed that there is no Hawthorne effect because students were not aware that this was an experimental situation.

Results are limited to the population of students doing remedial work at Kean College although the implications may be far greater.

DESIGN OF THE STUDY

Procedure

The Nelson-Denny Reading Test was administered to all incoming freshmen generally on form F. Students who scored below the ninth grade level were placed in the 0410 classes. The sample included students in the 0410 classes of the summers of 1982 and 1983 and the fall of 1982, excluding any who scored 9.0 or above on the pre-test. This left N=63 for summer, 1982, N=61 for fall, 1982, and N=59 for summer, 1983.

In the summer of 1982 two of seven sections received instruc-

tion. In the fall of 1982 and the summer of 1983 all sections of the 0410 classes had the Grid System as part of classroom instruction. Professors had been randomly chosen to teach the experimental groups. They were given 10 minutes instruction on the use of the Grid and were expected to employ it for about 30 minutes of the class time each period. The summer classes met four days a week for six weeks, excluding Independence Day, while the fall classes met twice a week for fifteen weeks, excluding one day of class for those who normally met on either Thursday or Friday for Thanksgiving recess.

Method of Gathering Data

Student had taken the Nelson-Denny, Form F which was used as a pre-test In the last week of instruction professors of the 0410 classes administered the Nelson-Denny, Form F. Professors hand scored the tests and interpreted the raw scores into grade equivalents according to the manual prepared for the Nelson-Denny. Results are kept on file in the office of Communication Sciences.

Data Gathering Instrument

The Nelson-Denny is a timed test consisting of two sections, one testing vocabulary, the other comprehension. The student has 15 minutes to fill in an incomplete phrase with an appropriate vocabulary word. The comprehension section consists of 30 comprehension questions to be answered in 20 minutes on material in three passages. The tester may also stop the reading after the first minute of the test to compute the reading rate. A raw score, percentile, or grade equivalent can be determined after

scoring. For the purpose of this study the grade equivalents of the comprehension section were used.

With the aid of the Apple Basic Computer a t-test was done to see if there was a significant difference between mean gains of those using the Grid over those receiving regular instruction in the control group in the summer of 1982. The sample using the Grid in summer of 1983 was compared with the control group of summer, 1982 as a replication of the study. Also the mean gain scores of the fall 1982 of all Grid groups was compared to those of the summer, 1982 Grid groups to see if there was any significance in achievement as result of the different instructional periods: the EEO summer period being twenty-three sessions, four days for a six week period versus the fall period being twenty-nine sessions, two days for fifteen weeks.

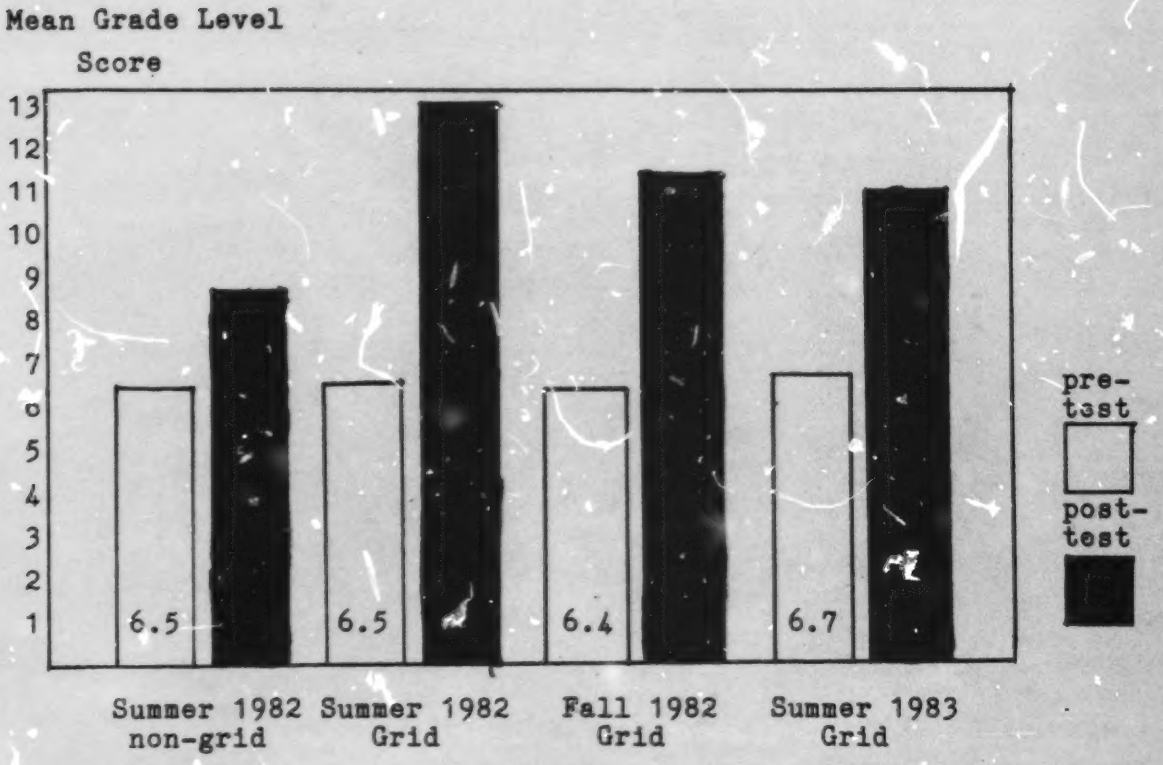
It was assumed that if the significance of difference exceeds the .05 level of confidence that the null hypothesis will be rejected.

RESULTS

Mean grade scores of the non-Grid and Grid section were compared to see if there was a significant difference between those who received treatment over against those who did not. (See Figure #1.)

Of the summer, 1982, non-Grid classes there were forty-two students, twenty-one being in classes receiving instruction in the Grid system. Pre-test mean scores were 6.32 for the control

Figure 1
Comparison of Mean Scores



group and 6.048 for the Grid group. (Variance and standard deviation figures can be seen in Table #1). A t-value of .873 with 61 degrees of freedom indicated that there was no significant difference between the samples in achievement at the onset of the study. However, the post-test mean scores of 8.70 for the control as opposed to 12.8 for the Grid classes showed a t-value of 11.5 with 61 degrees of freedom, indicating a highly significant difference, below the .01 level of confidence, as the t far exceeds 2.58.

Comparison of the summer, 1982 control group with the sixty-one Grid instructed students of fall, 1982 was 6.32 for the control and 6.41 for the fall, 1982 students. A t-value of .79 with 101 degrees of freedom shows that no significant difference existed

Table 1

Mean, Variance, and Standard Deviation of Grid and non-Grid Classes

	summer, 1982 non-Grid		summer, 1982 Grid		fall, 1982 Grid		summer, 1983 Grid	
	pre	post	pre	post	pre	post	pre	post
sample size	21	21	42	42	61	61	59	59
mean	6.476	12.785	6.316	8.697	6.407	11.730	6.670	10.964
variance	1.49	3.36	2.52	8.70	2.93	6.68	2.35	10.07
standard deviation	1.22	1.83	1.59	2.95	1.40	2.58	1.53	3.17

those instructed in the Grid Systems over those not instructed, it is concluded that the Grid Systems did in fact affect grade scores in comprehension on the Nelson-Denny Test positively. Therefore, the null hypothesis is refuted.

If indeed the Grid Systems instruction time was shortened or deleted altogether by instructors as the semesters progressed another implication is evidenced. It should be noted that the group with the lowest mean gain (summer, 1983) still had a significant gain over those not using the Grid. Possibly even erratic instruction in the Grid will result in higher Nelson-Denny scores and improved comprehension.

It is recommended that further research be done on use of the Grid Systems with college students.

AUTOMATICITY AND THE GRID SYSTEMS:
RELATED RESEARCH

Reading and study skills have been taught for many years at the college level. There has been a trend recently to provide adequate instruction for beginning college students in order to establish them in reading habits appropriate for a college career. Devirian, Gwyn, and Smith found that of 1259 responding institutions, 761 had reading/study skills programs. Of those, the largest number began between 1970 and 1972. Mione (1977) reports that of 204 responding schools, 195 pre- and post-tested reading classes with the Nelson-Denny. He relates that Grace Brown does not believe accurate reading can take place without phonetic analysis. Barbara Oakman has not found much research regarding teaching phonics at the college level. If it is used at all, it is a review. She feels there is a need to learn phonics skills as the foundation of language and to increase vocabulary.

There are a variety of approaches to the teaching of reading, and many of these fit into categories of models of reading. Guthrie suggests two categories of reading models - 1) the assembly model, or how the process of perception, memory, verbal association, and language interact and function during the act of reading; 2) the system model in which the individual subskills, the single letter sounds, word meaning, and comprehension of sentences are interrelated. In using the Kennedy Institute Phonics Test with normal and disabled readers, she found that the normal readers showed a greater correlation among the eight subskills

between the samples on pre-test scores. But again, the mean post-test scores of 8.70 against 11.7 of the fall resulted in a t-value of 10.32 with 101 degrees of freedom. This is a significant difference below the .01 level of confidence.

Finally, the results of comparing the forty-two summer, 1982 non-Grid students pre-test mean score of 6.32 with the 6.67 mean score of the fifty-nine summer, 1983 Grid instructed students showed a non-significant t-value of 1.95 with 99 degrees of freedom. The mean of the post-test scores of the summer, 1982 control was 8.70 in comparison with the post-test mean of 11.0 for the 1983 Grid instructed group. This produced a t-value of 6.3, significant below the .01 level of confidence.

It may be noted that the difference between the mean gains of pre- and post-test scores of Grid over non-Grid classes was decreasing. The mean gain of the summer, 1982 non-Grid classes was 3.4 and 6.3 for the Grid, a difference of 2.9 grades. The mean gain of the fall, 1982 Grid subject's scores was 4.3, a difference over the summer, 1982 non-Grid group of 2.0 grades. Whereas the mean gain of the summer, 1983 Grid group of 4.3 was only .9 grades over the 3.4 mean gain of the summer, 1982 non-Grid control group. This decline may suggest a spasmodic use of the Grid System in class instruction. There was reluctance on the part of some professors and students to use the Grid because it can become monotonous drill and therefore might have been used less frequently.

CONCLUSIONS

In light of the significant difference of the mean scores of

than the disabled readers. It was assumed that if this was the case, the system model would hold true. Therefore, facility in subskills appears to be important in fluent reading.

De Beaugrande, (1981) in what this author judges to be a classic article on process models of reading, suggests that automatization is one of 16 criteria which can be used to characterize various models of reading. He indicates that La Berge and Samuels are leaders in this field of research.

Before considering this element, however, the matter of attention and its bearing on processing ought to be reviewed, because La Berge and Samuels (1974) state that their decision as to whether or not a skill or subskill and become automatic was based on whether or not the subject can focus attention elsewhere while processing information. And further (1974:295)

> The number of existing codes of any kind that can be activated at a given moment is sharply limited, probably to one. But the number of codes which can be simultaneously activated by outside stimuli independent of attention is assumed to be large, perhaps unlimited.

In other words if processing is automatic, as perception of tone and color are, according to La Berge, Van Gelder and Yellott (1970), then attention can be focused elsewhere.

La Berge (1973a) asked subjects to determine whether a target letter was the same as or different from the cue letter. They were to indicate if the target was the same or different. the extra time it took to process a letter once attention was shifted back to it determines the automatization of response.

La Berge (1973b) had 16 college students respond to the

familiar and unfamiliar letter patterns (BDPQ) and (WJM). In measuring the latency of response it was found that it took longer to respond to the unfamiliar pattern. However, the differences became smaller and smaller, latency in determining unfamiliar letters decreasing more sharply than that of the familiar until they were parallel on the fifth day. It appears that practice caused latency time to decrease as recognition became automatic. The implication is that automatic processing can be taught and learned by repetition. Gelman (1969), Samuels states, found evidence that cognitive strategies can be taught.

In another study by La Berge (1973) the automaticity of association processing was measured. The subjects were to name a familiar and unfamiliar letter. The time to respond was equal for familiar and unfamiliar letters and recognition time for each decreased. After 20 days of testing and training the drop leveled off. This may indicate the gradual learning of automatic naming association. The student may successfully name a letter or word, but with what amount of attention? Ideally attention need not be focused on the naming process.

Dahl, Samuels, and Archwamety (1973) explain that a task must first be attended to while it is practiced, but after repetition it will no longer need attention but will be automatic. He reports Huey describing the process well in 1908 and cites that Schmidt (1968) defining automaticity as the ". . . dropping out of conscious cues in learning." One would replace ". . .external cues (exteroceptive) with internal cues (propriceptive) then reduce the amount of attention paid on the task." (p. 33) Dahl

La Berge, and Samuels (1973) see the brain as a single channel processor. It may appear that attention can be on several things at a time, whereas actually the brain merely vacillates attention quickly between or among these stimuli. Therefore when decoding is automatic, the reader can concentrate on processing meaning.

The poor reader, Harris (1955) also found, makes errors in word recognition, goes back often, does not utilize contextual clues, and does not get deep structure meaning. This laborious word by word reading is sometimes the result of inaccuracy and slowness in word recognition. His attention is still being focused on figuring out the word so he has little left for attending to meaning. Rate is generally a by-product of instruction until the sixth grade, but it is not taught after that. It needs to be taught through the first year of college.

Ehri (1978) found that first and second graders were likely to experience interference from a distractor when they were processing unfamiliar words. Familiar words were recognized faster in training and subjects suffered less from distractors after the training. She concludes that automaticity must come first, then speed can be increased.

Processing individual words is time consuming and short term memory is affected. Wisher (1977:3) explains that some of the functions of short term memory in reading are as a ". . .storage buffer, holding perceptual information in phonological or visual form, or reworking on scratchpad memory for linguistic re-encoding." Once re-encoded somewhere else it is no longer needed in short-term memory. However, if new information arrives before the load is

transferred or disposed of, then an overload occurs. This can happen if one reads too quickly, deals with an unfamiliar word or sentence pattern or is interrupted by an external interference. When that happens the reader can choose between three options of processing. He may increase current fixation, backtrack or disregard and continue reading.

Those being instructed in developmental classes are probably choosing one of these options. If it be choice one or two he will be losing valuable time, attention will be diverted, and short term memory will be taxed. If it be choice of option number three too frequently, he will be losing word meaning. In all cases comprehension will suffer. This ties in with Samuels' (1975) deduction that more and less fluent readers were parallel in their ability to recognize words, but that the fluent readers were faster in response.

As letters are automatically processed so then can a morpheme or syllable be "chunked" for processing. Snow and Coots (1981) compare listening with reading. It is argued that listening is more natural and easier for most of us than reading because there are cues that chunk ideas for us. They tried putting arbitrary slash marks around thought units of text increased comprehension. Stevens (1981) also found the slash marks helping the high school subjects comprehend more efficiently.

One of the key elements of the Grid Systems is the rehearsal of lists of words arranged on co-ordinates representing the combination of two types of graphemes--vowels, consonants, and blends thereof. In instruction it is assumed that the student is attend-

ing to the words as the instructor says them and is also attending to the graphemic patterns of each word as he repeats it. Seeing the word in isolation focuses attention on the phonetic as well as graphemic and morphemic elements of its structure. At this point it might be added that though the Grid is designed to develop the adult's reading/writing vocabulary, it appears that it would also greatly enhance the listening/speaking vocabulary as well.

The syllabic pattern of the Grid becomes increasingly complex and every morpheme is a word. This development may encourage chunking and be of help in allowing attention to be directly focused on word recognition than on phonemic components.

As the words increase in length syllabically, they do not necessarily increase in difficulty of meaning or frequency. For example, one word on the first page of the learner's manual is "hoy," a low frequency word, whereas the last page of the manual, Part II, is the word "characteristic," a rather high frequency word. As a word is learned on the grid it will more likely be recognized when seen in context. This does not affect objective frequency as categorized in a book such as Thorndike and Lorge's (1944) The Teacher's Word Book of 30,000 Words, but it will increase the frequency in which it will be processed and understood by the reader.

Jenkins (1978) cites a study by Marks, Doctorow, and Wittrock (1974-75) in which two versions of the same text were to be read by sixth grade students. One version used high frequency words, the other low. It was found that those who read

the version using high frequency words comprehended the passage better.

All parts of speech are used in the Grid including proper nouns, so a large vocabulary is covered. Jenkins (1978) reminds us that Chall (1958) and Klare (1974) found that vocabulary is related to difficulty of material. He also cites Davis (1964,68) who tested nine comprehension skills, five of which were significant. One of those five was word meanings. The Stanford Achievement and Metropolitan Achievement tests of 1970 subtest vocabulary because of its relation to comprehension. Finally Jenkins (1978:5) quotes Spache and Spache (1973) who indicated that "It is safe to say that comprehension is significantly promoted by attention to vocabulary growth." The factor of reasoning is probably the greatest component of comprehension, but vocabulary is second, though some writers would say vocabulary is the most important factor.

In conclusion, the components of reading including automaticity, chunking, vocabulary, and, to some degree, rate are addressed in part by the Grid System, an approach to word recognition - vocabulary development.

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